The Pieces

- Dispersion only

$$M_D(D, D') = \begin{bmatrix} 1 & 0 & 0 & D \\ 0 & 1 & 0 & D' \\ -D' & D & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

  - Bends
  - Quads

- Longitudinal rotation

$$M_L(\mu, \beta) = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & \cos\mu & \beta \sin\mu \\ 0 & 0 & -\dfrac{1}{\beta}\sin\mu & \cos\mu \end{bmatrix}$$

  - Momentum compaction (bends and quads)
  - Normal RF cavity

The Emittance Exchange

- Three dispersions, two rotations

$$M_D(D,0)M_L(\pi/2,D)M_D(0,-1)$$
$$M_L(-\pi/2,D)M_D(D,0) =$$
$$\begin{bmatrix} 0 & 0 & 0 & D \\ 0 & 0 & -\frac{1}{D} & 0 \\ 0 & D & 0 & 0 \\ -\frac{1}{D} & 0 & 0 & 0 \end{bmatrix}$$

  - Two short linacs
  - Three sets of bends
  - Sundry quads

- Idea for use
  - Before cooling: $\epsilon_{\|} = 30$ mm, $\epsilon_{\perp} = 10$ mm
  - Transverse got down by mini-cooling
  - Exchange, so longitudinal now small
  - Mini-cool new transverse